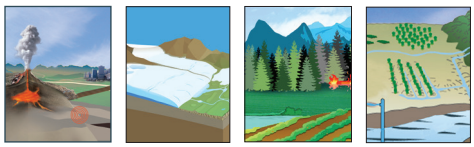
National Aeronautics and Space Administration

NASA–ISRO SAR Mission

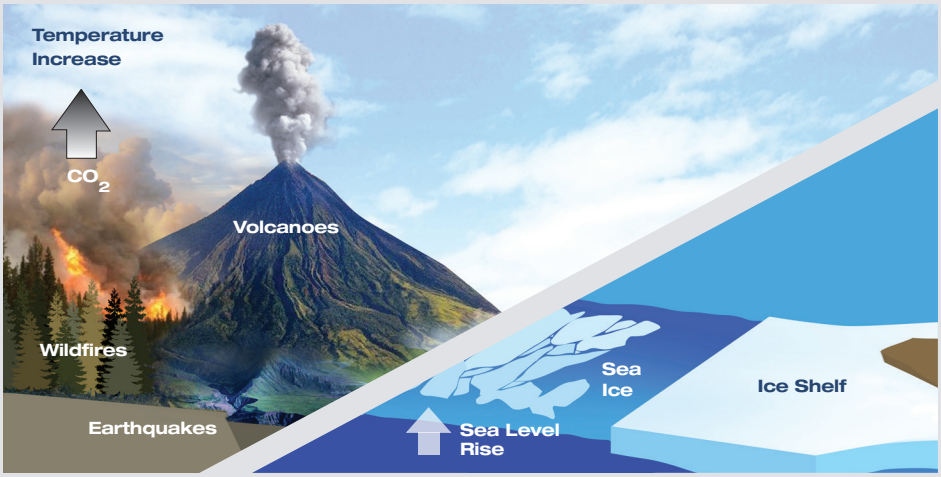


Sensing Our Changing Earth

NISAR will measure Earth's changing ecosystems, dynamic surface, and ice masses, providing information about biomass, natural hazards, sea level rise, and groundwater.

Clarifying Causes and Consequences

The NASA–ISRO Synthetic Aperture Radar, or NISAR, mission will make global measurements of the causes and consequences of land surface changes for integration into Earth system models. NISAR will provide a means to measure and clarify processes ranging from ecosystem disturbances to ice sheet collapse and natural hazards including earthquakes, tsunamis, volcanoes, and landslides.



Monitoring Earth's Changing Surface

Earth's land surface is constantly changing and interacting with its interior and atmosphere. The causes and consequences of change on the Earth's surface are complex and interrelated. Changing land use impacts the carbon cycle, which modifies Earth's climate, causing retreat of ice masses, in turn raising sea level, and resulting in altered coastlines. The impacts of a changing climate at the Earth's surface can include subsidence from water withdrawal or melting permafrost, landslides from increased storm activity, and changes to shipping lanes from a reduction of sea ice. Natural hazards such as volcanoes and earthquakes further shape the land surface and can have devastating impacts to human populations.

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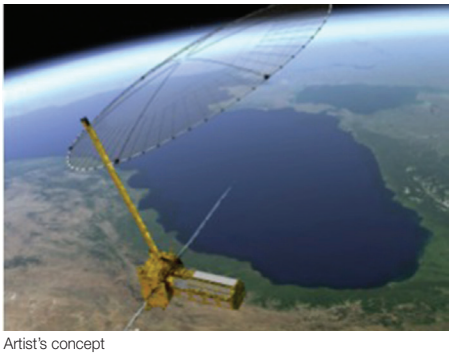

Artist's concept

The NISAR Mission — All-Weather Day and Night Imaging

The NASA–ISRO Synthetic Aperture Radar (NISAR) mission will acquire radar images of surface changes globally. Rapid sampling over the lifetime of the mission will allow for understanding Earth processes and change. Radar penetrates clouds and operates day and night, enabling reliable and continuous monitoring at all times. Orbiting radar captures images of the movements of the Earth's surface, and land and sea ice over time, revealing subtle changes in the surface as well as what is happening below the surface. It captures forest volume and biomass over time and with enough detail to reveal changes on human scales. It produces images with sufficient resolution to see local changes and has broad enough coverage to monitor regional events. Detailed observations would allow us to better manage resources and prepare for and cope with hazards and global change.

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Addressing an Increasing Exposure to Natural Disasters

NISAR will measure surface changes to determine the likelihood of earthquakes, volcanic eruptions, and landslides. Earthquakes and volcanoes cause billions of dollars in damage and loss of life. Geologists say the Pacific Northwest and California are due for large earthquakes. Populations are increasing in high-risk areas vulnerable to sea level change, land subsidence, tsunamis, volcanoes, earthquakes, and landslides. Improved forecasting and mitigation necessitates understanding these natural hazards, with measurements throughout the hazard cycle.

Tracking Global Carbon and Understanding Land Use

NISAR will determine the contribution of Earth's most variable biomass to the global carbon budget and characterize ecosystem disturbance and impacts on biodiversity. Landscapes are rapidly changing as forests are cut down and agricultural lands are developed. Land ecosystems, which act as carbon sources and sinks, must be studied now for us to understand how they may interact with climate as atmospheric CO_2 increases.

Assessing Society's Exposure to Diminishing Ice

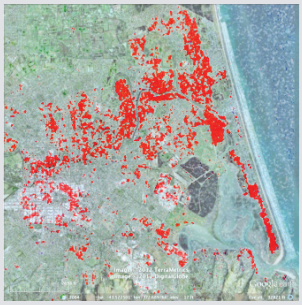
NISAR will determine how the behavior and evolution of ice masses will contribute to sea level rise. NISAR will measure changes in sea ice, snow extent, permafrost, and surface melting. Ice sheets, sea ice, and glaciers, which are key indicators of climate effects, are undergoing dramatic changes. Rising sea level from melting ice sheets poses hazards to coastal areas from storm surges and erosion. Diminishing sea ice is changing shipping lanes and availability of resources. Measurements now will be used to predict future changes.

Monitoring Earth's Reservoirs

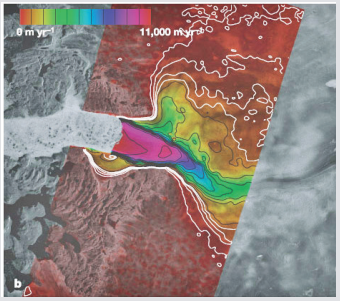
NISAR will monitor hydrocarbon and geothermal reservoirs, and measure changes in groundwater over the Earth's vulnerable arid regions. Informed decisions allow us to make the most of our resources sustainably and economically. By measuring changes of the Earth's surface, we can understand processes occurring below the surface and impacts. Subsidence is often the first indication of changes in reservoirs or over-exploitation of aquifers. Subsidence that continues for too long can lead to irreversible collapse of the aquifer system.

Addressing Society's Needs

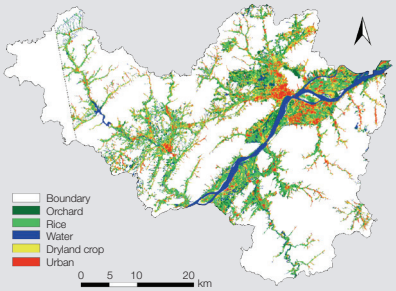
Earthquakes



Glaciers



Crops



Subsidence

U.S. losses from earthquakes are $5B/year and the economic impact of sea level rise on the U.S. will exceed $20B.

Radar can be used to produce damage maps after earthquakes (left), determine the speed of glaciers (middle left), classify crops (middle right), and monitor subsidence

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For more information, visit: http://nisar.jpl.nasa.gov